Session 1

Highlighting Multiples in 100 Charts

Materials

- Student Sheet 4 (11 per student, 2 transparencies)
- Colored pencils, markers, or crayons
- Overhead projector, transparency pens of various colors
- Stapler

What Happens

Students highlight multiples of 2's and 3's by making a chart for each one. They discuss the patterns they find and count around the class by 2's and then 3's. Student work focuses on:

- skip counting by 2's and 3's
- finding patterns in 2's and 3's charts

Ten-Minute Math: Counting Around the Class In the next two days, continue to do Counting Around the Class (see p. 91 for instructions) in short sessions outside the math hour. Count by 5's and 10's.

Before you begin, ask:

Do you think our final number will be more than 50? Why do you think so? Do you think it will be more than 100? More than 200?

Stop two or three times during the count and ask questions like this:

We're at 35 now—how many more students will have to have turns to get to 50?

Activity

Highlighting 2's and 3's

Multiples of 2 Using the overhead projector, show a 100 chart (you can use a transparency of Student Sheet 4) and label it "2's."

I want to highlight the numbers that can make groups of 2 today. I'm going to label the top of my 100 chart "2's." What numbers do we know we can make into groups of 2 with none left over?

Highlight numbers on the 100 chart according to your students' instructions. The highlighting can be done in any way that shows the patterns clearly but leaves the numbers easy to read: circling, shading in, or outlining the frames around the numbers.

After enough numbers have been highlighted to begin to form a pattern, ask students to name multiples of 2 among the numbers over 50 (skipping around, not in order). After highlighting about half the multiples of 2, ask students what patterns they see that can help them fill out the rest of the chart. They should notice the columns of highlighted numbers under 2, 4, 6, 8, 10.

Pass out a copy of Student Sheet 4, 100 Chart with Skip Counting Circles, to each student. Students label the top of the chart "2's" and then color in the even numbers—the multiples of 2. Suggest that students begin by marking lightly with pencil so that they can erase any mistakes. After completing about three rows, they should check with a partner to make sure they are on the right track before completing the chart with a permanent color.

Students who finish early can write 2, 4, 6, 8, and so on in the circles at the bottom of the student sheet. If there is even more time, students can turn the sheet over and write some of the patterns they see. For example:

They're all in lines going up and down.
They're stripes.
They're all even.
They all end in 0, 2, 4, 6, 8!

Multiples of 3 As you project a clean 100 chart in front of the class and label it "3's," say:

Now I'd like to make a chart about 3's. This chart will be about numbers that make groups of 3, so I am labeling it "3's."

Using a color that contrasts with the color you used for the 2's chart, highlight the multiples of 3, following your students' instructions. Again, encourage students to skip around on the chart and to name some multiples of 3 larger than 50. When you have highlighted enough multiples of 3 to see the diagonal pattern, ask:

What patterns do you see? Can you use these to help pick other numbers to highlight?

1	2	(3)	4	5	(6)	7	8	(9)	10
11	(12)	13	14	(15)	16	17	(18)	19	20
(21)	22	23	(24)	25	26	(27)	28	29	(30)
31	32	(33)	34	35	(36)	37	38	(39)	40
41	(42)	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	(60)
61	62	63	64	65	(66)	67	68	(69)	70
71	72	73	74	(75)	76	77	78	79	80
81	82	83	84	85	86	87	88	89	(90)
91	92	(93)	94	95	96	97	98	(99)	100

Give each student another copy of Student Sheet 4. Students label this chart "3's" and again color in or highlight in some manner the multiples of 3.

Multiples of 3 are particularly difficult for students to identify and highlight accurately. As before, caution them to begin working with pencil and check their work before using crayons or markers. See the **Teacher Note**, Students' Problems with Skip Counting (p. 25), for more information.

When they have finished highlighting the 3's, students count in unison by 3's, referring to their charts if they like. Count a second time, this time without the charts, counting quietly between the 3's:

1, 2, **3**, 4, 5, **6**, 7, 8, **9**, 10, 11, **12**, 13, 14, **15**, ...

If they have not already done so, students fill in the circles at the bottom of their sheets as they count out loud. Challenge students to practice counting by 3's and to prepare to recite the 3's in small groups, without their charts, during another math hour.

Activity

Making Books of 100 Charts

Hand out 9 additional copies of Student Sheet 4 to each student. Students staple the sheets together with those from the previous activity so that the 2's and 3's charts are the top two pages. Students label the rest of the sheets to make charts of multiples from 4 to 12.

If there is time now, students can highlight charts for multiples of 4 and 5. Tell students the class will be discussing 4's in the next session. Remind them to fill in the skip counting circles and write the patterns they see in the charts on the back of each sheet.

❖ **Tip for the Linguistically Diverse Classroom** Students who are not yet writing in English may describe the patterns in their native language, supplementing their descriptions with visual diagrams.

Session 1 Follow-Up

Homework

Multiples on 100 Charts Students should take home their stapled booklets of 100 charts. They continue to highlight their 100 charts and to find patterns through 8's. Remind them that they must remember to bring their book of charts back for class tomorrow.

Students' Problems with Skip Counting

Teacher Note

Some students have difficulty keeping track of their skip counting on the 100 chart. Here are some confusions we have noticed in classrooms:

- Some students always start on 1, no matter which number they are skip counting by.
- The count may get off by 1 because the student pauses at a circled number, then starts counting again with that number. For example, when counting by 6's, a student counts 6, 12, 18, then begins the next count on 18. After counting six more numbers (18, 19, 20, 21, 22, 23), the student lands on 23 instead of 24.
- Students sometimes follow a "false pattern" that doesn't actually work for the number they are counting by. For example, they may circle 3, 6, 9, then color straight down the columns under the 3, 6, and 9, not realizing that the 3's pattern doesn't continue in columns the way the 2's pattern does.
- Students may miscount one interval and then continue counting correctly, so that all subsequent numbers are affected by the original mistake. For example: 3, 6, 9, 12, 15, 19, 22, 25, 28 ....

Some of these difficulties are simply miscounting mistakes that anyone can make. Help students to use the pattern on their counting charts to check: Does the pattern continue consistently on the chart? Also, have students double-check each other. When two or three students compare charts, they can often find and correct their own miscounting.

However, some students may truly not understand what they are doing when they "count by 2's" or "count by 3's" on their charts. Here, using cubes as a first step will help. That is, when counting by 2's, the student makes a group of 2 cubes, then marks 2 on the chart; makes another group of 2 cubes (perhaps in a different color), and marks the total, 4; then makes another group of cubes, marks the total, 6; and so forth. Students will naturally stop using the cubes as soon as they feel comfortable with skip counting.

We have found that it's not helpful for students to use cubes to mark squares directly on the counting charts. Students can't see the numbers underneath them, and they often move a cube accidentally to a neighboring square, thereby misleading themselves about the pattern on the chart.